Integrated Math 2
Key Concept 9 REVIEW

Name: Inked Copy

Period: ____________

Target 9A: Prove that circles are similar.

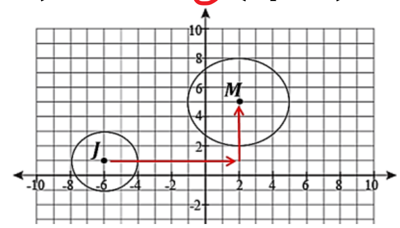
1. Prove that $\odot J$ with center $(-6, 1)$ and radius 2 is similar to $\odot M$ with center $(2, 5)$ and radius 3. (1 point)

x y   x y

(find the difference between x & y coordinates)

Translation: 8 units right, 4 units up

Scale factor: $\frac{3}{2}$ (divide radii)

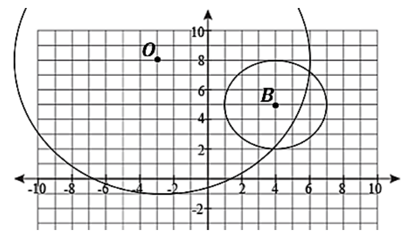


2. Show the two given circles are similar by stating the necessary transformations from $\odot B$ to $\odot O$. (1 point)

$\odot B$: center $(4, 6)$ radius 3. $\odot O$: center $(-3, 8)$ radius 9.

Translation: Left 7, Up 3

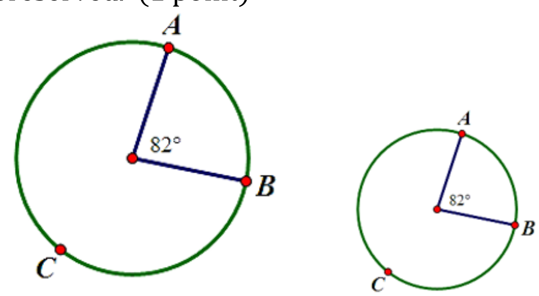
Scale Factor: $\frac{9}{3} = 3$



3. When transforming circles, explain why the central angle is always preserved. (1 point)

All circles are similar.

∴ Measurements of corresponding arcs & central angles are equal.



4. $\odot K$ is given below. $\odot T$ is represented by $(x-4)^2 + (y+5)^2 = 9$. (3 points)

Center: $(4, -5)$
radius: $\sqrt{9} = 3$

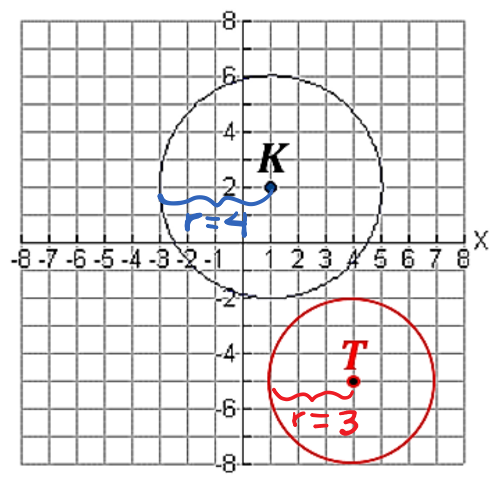
a) DRAW $\odot T$ on the coordinate plane.

b) Determine the TRANSLATION that would have to be performed from $\odot K$ to $\odot T$?

7 units down,
3 units right

c) Determine the SCALE FACTOR that would have to be performed from $\odot K$ to $\odot T$?

(divide radii) $\boxed{\frac{4}{3}}$

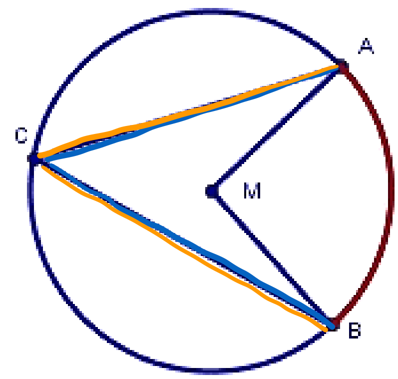


5. Given $\odot Y$ with a central angle $\sphericalangle Y = 15°$ and $\odot A$ with a corresponding central angle $\sphericalangle A = (2m - 9)°$. Set up an equation that models this situation and solve for m. (3 points)

$$2m \cancel{-9} = 15$$
$$\cancel{+9} \quad +9$$
$$\frac{\cancel{2}m}{\cancel{2}} = \frac{24}{2}$$
$$\boxed{m = 12}$$

Target 9B: Identify and describe relationships among central angles, inscribed angles, radii, and chords.

Use the figure at the right to answer questions #6 – 8 where *M* is the center.



6. Identify an INSCRIBED ANGLE. (1 point)
(vertex on circle)
$\sphericalangle ACB$

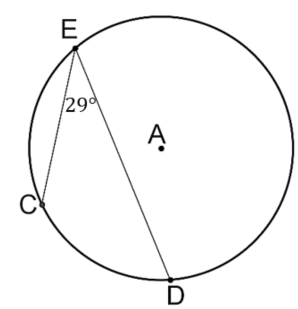
7. Identify a CHORD. (1 point)
(line segment w/ endpoints on circle)
$\overline{AC}$, $\overline{BC}$

8. Identify a MAJOR ARC. (1 point)
(greater than 180°)
$\overparen{ACB}$, $\overparen{ABC}$, $\overparen{CAB}$, $\overparen{BCA}$

9. Angle E is an INSCRIBED ANGLE in the given circle. Determine the measure of $\overparen{CD}$. Explain the relationship between an inscribed angle and its intercepted arc. (3 points)

$\overparen{CD} = 29° \cdot 2 \Rightarrow \boxed{58°}$

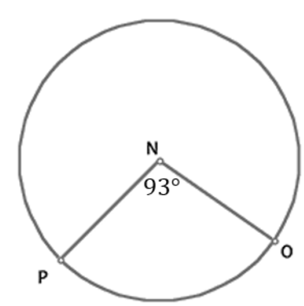
The inscribed angle is HALF the measure of its intercepted arc.



10. Angle N is a CENTRAL ANGLE in the given circle. Determine the measure of $\overparen{PO}$. Explain the relationship between a central angle and its intercepted arc. (3 points)

$\overparen{PO} = \boxed{93°}$

The central angle is EQUAL TO the measure of its intercepted arc.



Target 9C: Apply the formula for arc length and area of a sector of a circle and calculate using the radius and/or the measure of the central angle.

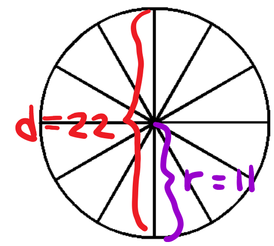
11. Convert $\boxed{205°}$ to radians. $\boldsymbol{Radians = degrees \cdot \frac{\pi}{180}}$ (1 point)

$$\text{Radians} = \frac{205}{1} \cdot \frac{\pi}{180} \Rightarrow \frac{205\pi}{180} \text{ (reduce...)} \Rightarrow \boxed{\frac{41\pi}{36}}$$

12. A round pizza with a 22" diameter is cut into 12 congruent slices. What is the area of one slice/sector? (in terms of π) $\boldsymbol{Area_{circle} = \pi r^2}$ (1 point)

$$A_{circle} = \pi \cdot 11^2 \Rightarrow 121\pi$$

$$A_{sector} = \boxed{\frac{121\pi}{12}} \text{ (divide by \# of slices)}$$

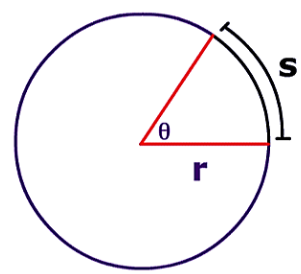


13. Derive the formula for the arc length using the diagram. (1 point)

$$\text{Angle} = \frac{\text{arc}}{\text{radius}}$$

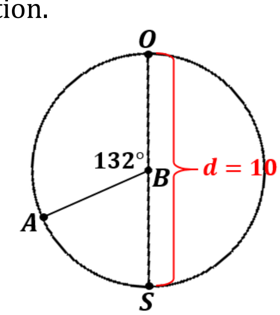
$$r \cdot \theta = \frac{s}{\cancel{r}} \cdot \cancel{r}$$

$$\boxed{r\theta = s} \text{ OR } \boxed{s = r\theta}$$



14. In $\odot B$, $\overline{OS}$ is a diameter with length of 10, and $m\angle OBA = 132°$ (3 points)

a) Draw $\odot B$ with the given information.



b) Find the length of $\widehat{OA}$ in terms of π. **Formula:** $\frac{\boldsymbol{arc\ length}}{\boldsymbol{\pi \cdot diameter}} = \frac{\boldsymbol{central \angle}}{\boldsymbol{360°}}$

$$\frac{\widehat{OA}}{10\pi} = \frac{132°}{360°}$$

$$\frac{\cancel{360}(\widehat{OA})}{\cancel{360}} = \frac{1320\pi}{360}$$

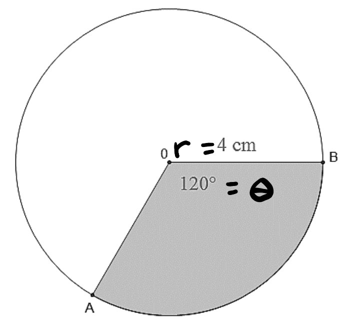
$$\widehat{OA} = \boxed{\frac{11\pi}{3}}$$

15. Calculate the area of the shaded sector with a central angle of 120°. (3 points) **Formula:** $A_{sector} = \pi r^2 \cdot \frac{\theta}{360}$

$$A_{sector} = \frac{\pi \cdot 4^2}{1} \cdot \frac{120}{360} = \frac{1920\pi}{360}$$

(reduces...)

$$= \boxed{\frac{16\pi}{3}\ \text{cm}^2}$$



Target 9D: Given the equation of the circle, use the method of completing the square to determine the coordinates of the center and radius of the circle.

16. Use completing the square to find the center and radius of the circle. (1 point)

$x^2 + y^2 + 10y - 11 = 0$

$x^2 + y^2 + 10y = 11$

$x^2 + y^2 + 10y + \underline{25} = 11 + \underline{25}$

$\left(\frac{10}{2}\right)^2$

$x^2 + (y+5)^2 = 36$

Center: $(0, -5)$
radius: $\sqrt{36} = 6$

17. Use completing the square to find the center and radius of the circle. (1 point)

$x^2 - 6x + y^2 - 55 = 0$

$x^2 - 6x + y^2 = 55$

$x^2 - 6x + \underline{9} + y^2 = 55 + \underline{9}$

$\left(\frac{-6}{2}\right)^2$

$(x-3)^2 + y^2 = 64$

Center: $3, 0$
radius: $\sqrt{64} = 8$

18. Use completing the square to find the center and radius of the circle. (1 point)

$x^2 + y^2 - 8x - 2y - 8 = 0$

$x^2 - 8x + y^2 - 2y - 8 = 0$

$x^2 - 8x + y^2 - 2y = 8$

$x^2 - 8x + \underline{16} + y^2 - 2y + \underline{1} = 8 + \underline{16} + \underline{1}$

$\left(\frac{-8}{2}\right)^2 \qquad \left(\frac{-2}{2}\right)^2$

$(x-4)^2 + (y-1)^2 = 25$

Center: $(4, 1)$
radius: $\sqrt{25} = 5$

19. Use completing the square to find the center and radius of the circle: $x^2 + 8x + y^2 + 7 = 0$. (3 points)

$-7 \quad -7$

$x^2 + 8x + \underline{16} + y^2 = -7 + \underline{16}$

$\left(\frac{8}{2}\right)^2$

$(x+4)^2 + y^2 = 9$

$$\boxed{\begin{array}{l}\text{center: } (-4, 0) \\ \text{radius: } \sqrt{9} = 3\end{array}}$$

Center: $(-4,0)$

Radius: 3

20. Use completing the square to find the center and radius of the circle: $2x + x^2 + 6y = 15 - y^2$. (3 points)

$+y^2 \quad +y^2$

$x^2 + 2x + y^2 + 6y = 15$

$x^2 + 2x + \underline{1} + y^2 + 6y + \underline{9} = 15 + \underline{1} + \underline{9}$

$\left(\frac{2}{2}\right)^2 \qquad \left(\frac{6}{2}\right)^2$

$(x+1)^2 + (y+3)^2 = 25$

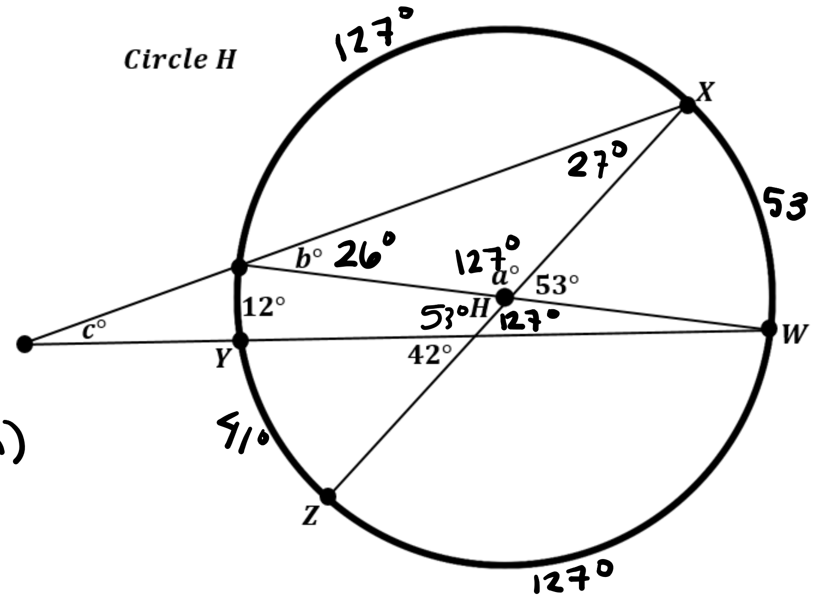
$$\boxed{\begin{array}{l}\text{center: } (-1, -3) \\ \text{radius: } \sqrt{25} = 5\end{array}}$$

Center: $(-1,-3)$

Radius: 5

ADVANCED (10 possible points)

Use the figure to the right to answer the questions that follow for $\odot H$.



1. Find $\widehat{XWZ}$.

$\boxed{80°}$ (diameter)

2. Solve for a.

(supplementary angles)

$180° - 53° = \boxed{127°}$

3. Find $\widehat{WX}$.

$\boxed{53°}$ (central angle given)

4. Solve for b.

$180 - 127 - 27 = \boxed{26°}$

5. Solve for c.

$\frac{1}{2}(53 - 12) = \boxed{20.5°}$

6. Find $\widehat{YW}$.

$41° + 127° = \boxed{168°}$

7. Find $\widehat{YZ}$.

$53° - 12° = \boxed{41°}$

8. Find $\widehat{ZW}$.

$\boxed{127°}$

9. Find $\widehat{YX}$.

$12° + 127° = \boxed{139°}$

10. Find $\widehat{YXW}$.

$12° + 127° + 53° = \boxed{192°}$